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10/600,107	06/20/2003	Prathyusha K. Salla	132535	7816

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EXAMINER	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/600,107	SALLA ET AL.	
	Examiner	Art Unit	
	Seyed Azarian	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 August 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-25* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3,15-17 and 19-25* is/are rejected.

7)☒ Claim(s) *4-14 and 18* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *10/14/2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

RESPONSE TO AMENDMENT

1. Applicant's amendment filed, on 8/27/2007, see page 8 through page 15, of the remarks, with respect to the rejection of claims 1-25 have been fully considered but they are moot in view of the new ground (s) of rejection is necessitated by applicant's amendment.

2. Applicant's argues in essence regarding claims 1, 23 and 24 that neither Yavus (the 074 patent) nor Yavus (the 712 patent), considered alone or in combination, describes or suggests a " acquiring images at multiple z-locations z1...zn and at different times t1...t, at each of the z-locations to obtain a plurality of acquired image sets, and each acquired image comprising, a reconstructed image based on acquired image".

Contrary to the applicant's assertion, Yavus (074 patent) discloses (column 3, lines 25-60, a slice image of the axis based on a plurality of projection views selected from respective ones of the plural sets, also software for tomographic cardiac image, generating a plurality of x-ray projection data sets based on detector data collected in respective different data acquisition cycles. Each projection data set comprises plural projection views of a subject's heart at a corresponding view angle and at successive positions on an axis of rotation through the subject. A plurality of stacked slice images are "reconstructed" based on respective projection view sets each comprising projection views selected from respective ones of the projection "data sets", and also column 9, lines 13-17 data values for the same axial position Z0, and column 16, lines 15-57, the gantry rotation period T, is less than the nominal period of the cardiac cycle);

However, regarding claim 1, Yavuz (074) discloses (Fig. 15 column 16, lines 58-67, reconciliation (synchronized) of the selected projection view sets, but does not explicitly state it

corresponding " reordering the images within at least one of the acquired image sets to obtain at least one synchronized image set". On the other hand Yavuz (712) in the same field of reconstruction of tomography teaches (column 7, lines 15-21, reconstruction engine 130 receives the sampled and digitized data (now termed "projection data") from the DAS 1124 and performs high-speed image reconstruction. The reconstruction engine 130 may comprise a separate processor 132 and memory 134. Various algorithms are known in the art for reconstruction a slice image from projection data comprising a plurality of projection views, also column 33, lines 5-12, a technique for Re-ordering in the phase Domain, further column 34, lines 7-19, an operation 3730 provides a reconciliation between the axial positions at which the projection view of a given set represent the object and the axial position at which the stacked slice images are to represent the object).

Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention was made to modify Yavuz (074) invention according to the teaching of Yavuz (712) because combination of two provides reordering the images acquired at a z-location, where each slice is from reconstructed raw image data, which can easily be implemented in tomography device.

Finally, the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art.

Furthermore, regarding applicant's argument in claim 22, that neither Yavus (the 074 patent) nor Yavus (the 712 patent), considered alone or in combination, describes or suggests a "computer-readable medium encoded with program". Examiner disagreed and indicated that Yavus (the 074 patent) discloses (column 3, lines 26 through 27, clearly state method, device, system and software (computer readable medium) for tomographic image reconstruction, also column 18, lines 56-67, "computer-readable medium encoded with a program" for performing topographic image generation).

Furthermore, regarding applicant's argument in claim 25, that neither Yavus (the 074 patent) nor Yavus (the 712 patent) considered alone or in combination, describes or suggests a "computed tomography to acquire CT images". Examiner disagreed and indicated that (column 8, lines 11-19, furthermore, typical x-ray CT systems (e.g., third generation systems and fourth generation systems) are an exemplary class of tomographic imaging systems. For example, magnetic resonance imaging (MRI) systems also are used to generate topographic images by computed topographic. Cardiac imaging can be performed with some MRI systems by processing a series of magnetic echo data sequences with various types of gating techniques.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-3, 15-17 and 19-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yavuz et al (U.S. patent 6,539,074) in view of Yavuz et al (U.S. patent 6,522,712).

Regarding claim 1, Yavuz (074) discloses a method for retrospective internal gating comprising (column 8, lines 31-45, retrospective gating);

acquiring images at multiple z-locations z1.....zn and at different times t1.....tn at each of the z-locations to obtain a plurality of acquired image sets, each acquired image set including only the images acquired at a single one of the z-location, each acquired image comprising a reconstructed based on acquired data (column 3, lines 25-60, a slice image of the axis based on a plurality of projection views selected from respective ones of the plural sets, also software for tomographic cardiac image, generating a plurality of x-ray projection data sets based on detector data collected in respective different data acquisition cycles. Each projection data set comprises plural projection views of a subject's heart at a corresponding view angle and at successive positions on an axis of rotation through the subject. A plurality of stacked slice images are reconstructed based on respective projection view sets each comprising projection views selected from respective ones of the projection "data sets", and also column 9, lines 13-17 data values for the same axial position Z0, and column 16, lines 15-57, the gantry rotation period T, is less than the nominal period of the cardiac cycle);

However, regarding claim 1, Yavuz (074) discloses (Fig. 15 column 16, lines 58-67, reconciliation (synchronized) of the selected projection view sets, but does not explicitly state it corresponding " reordering the images within at least one of the acquired image sets to obtain at least one synchronized image set". On the other hand Yavuz (712) in the same field of reconstruction of tomography teaches (column 7, lines 15-21, reconstruction engine 130 receives

the sampled and digitized data (now termed "projection data") from the DAS 1124 and performs high-speed image reconstruction. The reconstruction engine 130 may comprise a separate processor 132 and memory 134. Various algorithms are known in the art for reconstruction a slice image from projection data comprising a plurality of projection views, also column 33, lines 5-12, a technique for Re-ordering in the phase Domain, further column 34, lines 7-19, an operation 3730 provides a reconciliation between the axial positions at which the projection view of a given set represent the object and the axial position at which the stacked slice images are to represent the object).

Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention was made to modify Yavuz (074) invention according to the teaching of Yavuz (712) because combination of two provides reordering the images acquired at a z-location, which can easily be implemented in tomography device.

Regarding claim 2, Yavuz (074) discloses a method in accordance with claim 1 further comprising: extracting motion information from the images by using temporal data acquired at different times t1.....tn at each of the z-locations (Fig 11A-11C, also column 15, line 50 through column 16, line 8, refer to different trigger delays can be used to generate a four-dimensional model of the heart).

Regarding claim 3, Yavuz (074) discloses a method in accordance with claim 2 wherein reordering comprises cyclically reordering the images at each of the z-locations by synchronizing the motion information to have a common starting point (column 15, line 50 through column 16, line 8, refer to different trigger delays can be used to generate a four-dimensional model of the

heart, also Fig. 15 column 16, lines 58-67, reconciliation (synchronized) of the selected projection view sets).

Regarding claim 15, Yavuz (074) discloses a method in accordance with claim 1 wherein acquiring includes acquiring the images for a respiratory cycle of an object and at least one of a two-third and a complete gantry rotation (Fig. 1, column 4, line 63 through column 5, line 18, multiple cardiac cycles also refer to rotation of the gantry).

Regarding claim 16, Yavuz (074) discloses a method in accordance with claim 1 further comprising: designating one of the images in a temporal sequence t1.....tn at one of the z-locations as a reference image (column 9, lines 13-17data values for the same axial position Z0, also column 16, lines 22-41, the gantry rotation period T, is less than the nominal period of the cardiac cycle);

determining a closest image in which motion of an organ is minimal with respect to a position of the organ in the reference image, the closest image being an image in the temporal sequence t1.....tn at a z-location adjacent the z-location of the reference image (see claim 1, also column 14, lines 31-54, refer to reference).

Regarding claim 19, Yavuz (074) discloses a method in accordance with claim 1 wherein reordering comprises cyclically reordering a four-dimensional (4D) set of the images based on at least one of 1-dimensional (1D) motion information of an organ that is imaged and 2-dimensional (2D) image information of the images (see abstract image generation from four-dimensional projection data of an imaged object, also claim 1);

the cyclical reordering based on the 1D motion information providing a 1.sup.st set of reordered images and the cyclical reordering based on the 2-D information providing a 2.sup.nd

set of reordered images (column 8, line 61 through column 9, line 18, the two dimensional and one dimensions of the sonogram corresponds to angular position of the fan beam).

Regarding claim 20, Yavuz (074) discloses a method in accordance with claim 19 further comprising comparing the order of the first and second sets of reordered images to determine whether there is match between the orders of the first and the second sets (Fig. 15 column 16, lines 58-67, reconciliation (synchronized) of the selected projection view sets).

Regarding claim 21, Yavuz (074) discloses a method in accordance with claim 1 wherein acquiring the images includes acquiring the images for one breath cycle of an object plus at least one of 0.33 seconds and 0.5 seconds (column 9, lines 48-64, .5 second).

Regarding claim 22, Yavuz (074) discloses a computer-readable medium encoded with a program configured to, acquire images at multiple z-locations z1...zn and at different times t1...tn at each of the z-locations to obtain a plurality of acquired image sets, each acquired image set including only the images acquired at a single one of the z-location, each acquired image comprising a reconstructed based on acquired data (see claim 1, also column 18, lines 56-67, "computer-readable medium encoded with a program" for performing tomographic image generation).

Regarding claim 24, Yavuz (074) discloses an imaging system comprising, a scanner configured to generate attenuation data by scanning an object; and a controller electrically coupled to the scanner, the controller configured to: acquire images at multiple z-locations z1.....zn and at different times t1.....tn at each of the z-locations to obtain a plurality of acquired image sets, each acquired image set including only the images acquired at a single one

of the z-location each acquired image comprising a reconstructed based on acquired data (see claim 1, Fig. 1, element 130 (controller), also column 5, lines 46-54, refer to controller).

Regarding claim 25, Yavuz (074) discloses a computed tomography (CT) imaging system comprising: a radiation source; a radiation detector; and a computer electrically coupled to the source and the detector, the computer configured to: acquire CT images at multiple z-locations z1....zn and at different times t1....tn at each of the z-locations, each acquired image comprising a reconstructed based on acquired data (see claims 1 and 24, also column 6, lines 25-43, performing tomographic image, and computer 136).

With regard to claims 17, 23 the arguments analogous to those presented above for claims 1, 16, 22 are respectively applicable to claims 17, 23.

Allowable Subject Matter

5. Claims 4-14 and 18 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is an examiner's statement of reasons for allowable subject matter.

With respect to claim 4, closest prior art of Yavuz does not disclose or suggest, among other things, "dividing the mean intensity image into a matrix of blocks of a desired size of region of interest (ROI), generating a binary image to distinguish organs that are imaged from a background of the binary image, wherein the organs include internal organs and an outer abdominal wall and measuring mean intensity values at times t1.....tn for each of the selected ROI blocks, the mean intensity values measured from temporal data acquired at different times

t1....tn at the z-location at which the mean intensity image is computed; and plotting the mean intensity values as a function of times". Additionally with respect to claim 18, the closest prior art of Yavuz does not disclose or suggest, among other things, "identifying the organ boundary in the reference images and images at the z-location of the closest image, the images at the z-location of the closest image including the closest image, extracting normal flow vectors from the organ boundary in the reference image and the images at the z-location of the closest image, fitting the normal flow vectors within an affine motion model that outputs a measure of a motion of the organ and comparing motions of the organ in the images at the z-location of the closest image with the motion of the organ in the reference image".

These key features in combination with the other features of the claimed invention are neither taught nor suggested by the art of record.

Conclusion

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Contact Information

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Seyed Azarian whose telephone number is (571) 272-7443. The examiner can normally be reached on Monday through Thursday from 6:00 a.m. to 7:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Bella, can be reached at (571) 272-7778. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application information Retrieval (PAIR) system. Status information for published application may be obtained from either Private PAIR or Public PAIR.
Status information about the PAIR system, see http:// pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Seyed Azarian
Patent Examiner
Group Art Unit 2624
October 26, 2007

SEYED AZARIAN
PRIMARY EXAMINER